

# i.MX 8 Audio and Tensilica<sup>®</sup> HiFi 4 Overview

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# Agenda

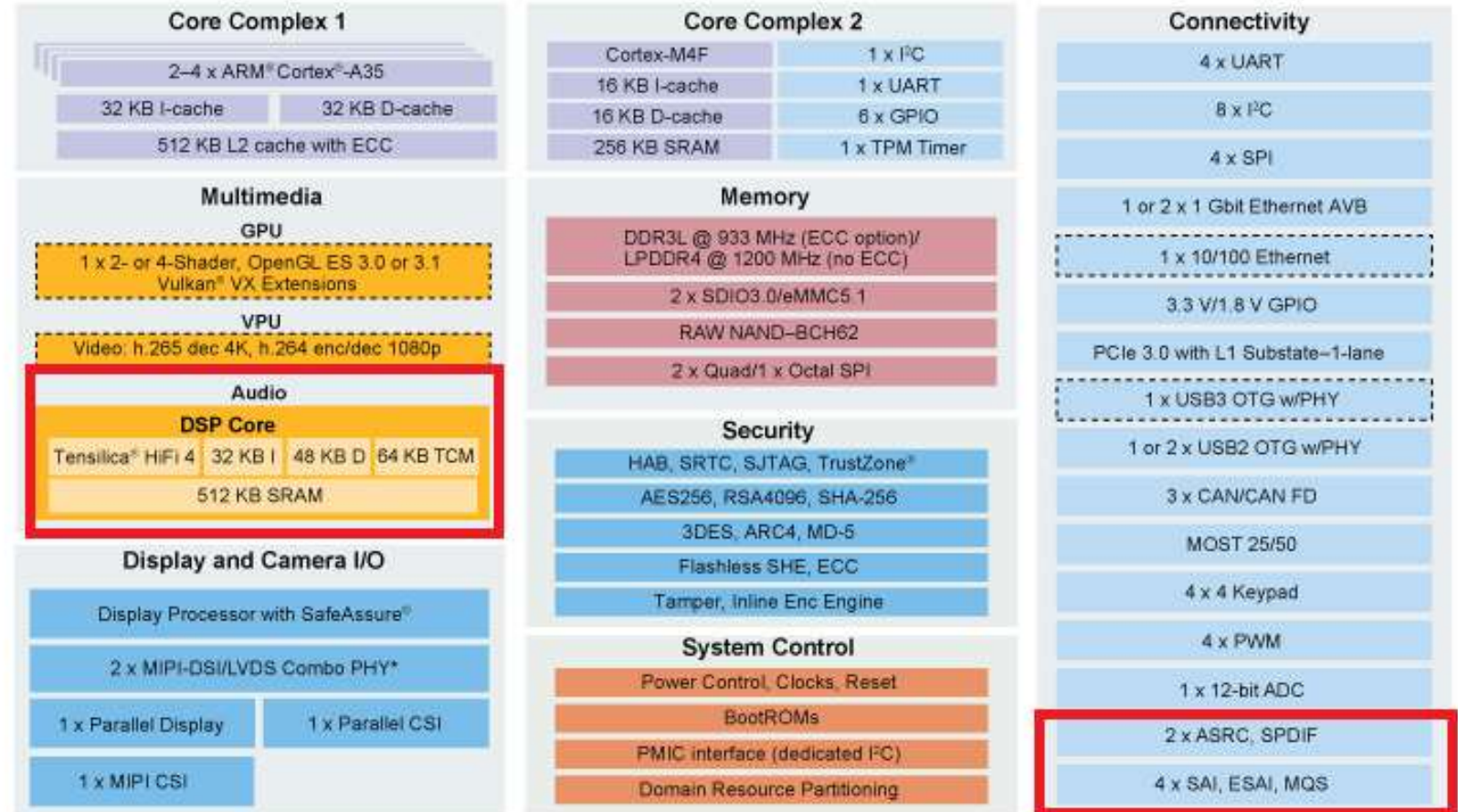
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- i.MX 8 Audio Interfaces
- HiFi 4 Overview
- i.MX 8 Linux BSP
- i.MX Audio Framework



# i.MX 8 Audio Interfaces

- DSP Core
- 2 x ASRC, SPDIF
- 4 x SAI, ESAI, MQS



\* Each single PHY can either be a 1x4 lane MIPI-DSI or a 1x1 channel LVDS interface for a total of 2 display interfaces. In combination, the two PHYs can be configured to be a single 2-channel LVDS interface.

Available on certain product families Note: Accessing muxable controller's full capabilities is dependent upon board component choices.

## i.MX 8 Audio Interfaces

- Audio and DMA Subsystems
- 1x HiFi4 DSP @ 666 MHz, Fixed-point and Vector-Floating-Point support  
32KB Instruction Cache, 48KB Data Cache, 64 KB TCM, and 448 KB of onchip RAM.
- 1x SPDIF
- 1x ESAI
- 4x SAI (SAI0 and SAI1 are transmit/receive; SAI2 and SAI3 are receive only)
- 1x Asynchronous Sample Rate Converter (ASRC)
- 1x Audio Mixer with dedicated SAI ports (AMIX)
- 1x Medium Quality Sound (MQS)

# HiFi4 DSP Features

- High Performance, DSP architecture
  - Utilizes standard HiFi4 toolchains
  - End customer programmable
  - Tuned for audio, voice and music
  - Expandable to customer-specific algorithms
- Large ecosystem of software from 3rd parties
  - License from wide variety of 3rd party supplier
  - 175+ 3rd party codecs and audio/voice enhancements
- Reuse across i.MX 8 and 8X
  - Same DSP, same TCM, same software

# HiFi 4 System Integration

- In order for an application to produce sound, the system must include several components:
  - hardware in the form of a sound card or sound chip => HiFi 4 DSP + Audio Peripherals
  - a device driver for the hardware => HiFi 4 Virtual Audio Device driver (Linux ALSA / QNX QSA)
  - a well-defined way for the application to talk to the driver, in the form of an Application Programming Interface (API)
- Benefit of HiFi 4 DSP compare to CPU:
  - DSP load is fixed (pre-defined algorithms) whereas CPU load is not predictable.
  - DSP (RTOS/Bare metal) latency is reduced compared to CPU HLOS (High Level OS)
  - DSP is seen as a sound card from HLOS with tuned algorithms. Limited integration work.

# Key Points

- Audio
  - Support for Audio pre-, post-processing and enhancement functions on Audio Focused DSP
    - Market leading HiFi 4 DSP
    - Full library of highly optimized software functions
  - Support for Audio codecs on ARM cores using Neon based codecs
    - Access to huge infrastructure of low cost & optimized functions
  - Support in HW for specific functions
    - Rate conversion, blending



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